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WARZYN

Permit
Application
60425.10

Closure/Post Closure Permit Application
Waste Management Site
Madison County, Illinois

Prepared for:
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Granite City Division
Granite City, Illinois

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CLOSURE/POST CLOSURE PERMIT APPLICATION
NATIONAL STEEL CORPORATION
GRANITE CITY STEEL DIVISION
WASTE MANAGEMENT SITE
MADISON COUNTY, ILLINOIS
JUNE 1989

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1.0 INTRODUCTION

1.1 GENERAL INFORMATION

This application and attachments are submitted in accordance with the descriptions and requirements outlined on IEPA Closure/Post Closure Permit IL 532 1435 LPC 220 12/85, in accordance with Illinois Solid Waste and Special Waste Management regulations, Illinois Administrative Code, Title 35, dated August 9, 1985, and in accordance with the specific requirements and provisions as set forth by the IEPA Division of Land Pollution Control for closure and post closure of the site. The specific requirements were developed in a meeting and follow up correspondence between the agency, Warzyn Engineering, Inc. and National Steel Corporation, Granite City Division (Granite City Steel).

Also included in these applications are full size (22" x 34") drawings (separately bound) 60425-22 through 29, presenting regional information, soil borings and groundwater monitoring information, proposed engineering design information, proposed monitoring plan and construction details.

The proposed closure area is a waste management site area and is adjacent and northeast of the existing Granite City Steel Landfill. Granite City Steel will be the owner and licensee of the site.

This document is generally divided into the following four sections: "Introduction", describing general information about the facility; "Site Characteristics", describing regional and local physical and hydrogeological conditions; "Construction and Operating Plans", describing initial construction requirements and previous operating information, and "Closure and Post Closure Plan", describing construction and monitoring requirements during closure and the long term care periods. Portions of the text and specific drawings that apply to the application form is referenced in the form in Appendix A.

2.0 SITE CHARACTERISTICS

This section provides information regarding site characteristics required in the permit application. Geology, hydrogeology, landfill hydraulic properties and a groundwater monitoring plan are included.

2.1 GEOLOGY AND HYDROGEOLOGY REPORT

2.1.1 Physical Setting of Granite City Steel Waste Management Site

2.1.1.1 Topographic Setting

The Granite City Steel (GCS) waste management site is located in Madison County, Illinois (Sections 20 and 29, T3N, R9W, Nameoki Township), approximately 2.6 miles east of the Mississippi River and 2.7 miles north of East St. Louis as shown on the Location Plan (Sheet 1 of the Drawings). It is located within the river valley in a physiographic province called the American Bottoms. The surficial geologic materials are characteristic of fluvial and floodplain alluvium. However, because of the flood control devices which have been constructed along the Mississippi River, the site is not located within a present day flood plain. The original local topography of the region is flat, with original elevations varying from 405 to 415 feet above mean sea level (amsl).

The waste management site's existing fill grades comprise an area of approximately 15 acres with 7.5 acres on the east side of the road and 7 acres on the west side. Existing plateau elevations on the east side range from 415 ft in the south to 420 ft toward the north with small areas of higher elevations. On the west, elevations range from 420 ft in the south to 426 ft toward the north. Refer to Drawing 60425-25.

The existing waste is proposed to be graded to create uniform grades which will receive 3 ft of final cover. Refer to Drawing 60425-27. On the east side of the road, top of final cover will be at elevation 424.2 ft sloping in all directions at a 2% slope to elevation 420 ft. Sideslopes will be 3H:1V from that elevation to meet existing grades. On the west side, top of final cover will be at elevation 428 sloping at a 2% slope to elevation 424 ft. Sideslopes will be 3H:1V to meet existing grades.

2.1.1.2 Regional Geology

The GCS Waste Management site is located near the center of a filled bedrock valley of the Mississippi River (Drawing 60425-23). The valley fill has an average thickness of about 120 feet, ranging from a feather edge near the bluffs of the Mississippi River Valley, to thicknesses greater than 170 feet in the north-central part. A major part of the fill consists of recent (since glacial times) fine-grained alluvium, which has been deposited on top of valley-train glacial deposits.

The valley-train deposits consist of coarse sand and gravel. They are commonly found just above the bedrock and generally average 30-40 feet thick (Schicht, 1965). These deposits constitute the primary aquifer which has been developed for industrial water supply in the American Bottoms. The valley fill grades from fine-grained clay and silt near ground surface, to coarser grained deposits with depth. Refer to Appendix C for Private/Public Industrial Well Logs.

2.1.1.3 Flood Plain

Small areas located on the east side of the GCS property, north of Horseshoe Lake are considered flood plain by the Federal Emergency Management Agency. The flood plain area is shown on Drawing 60425-23. There is no regrading or filling proposed in the flood plain area.

2.1.2 Hydrogeologic Setting of Granite City Steel Landfills

2.1.2.1 Surface Water Hydrology

Natural surface drainage is poorly developed in the American Bottoms. Development of the area led to a system of drainage ditches, levees, canals, and channels (Schicht, 1965). Drainage is normally toward the Mississippi River and its natural and manmade tributaries. Precipitation falling on the site runs off in all directions either directly or via a swale along the road. Runoff flows to the low areas on each side of the landfill and percolates into the ground. Refer to the drawings for location of these low spots and direction of flow.

2.1.2.2 Groundwater Hydrogeology

Bedrock consists primarily of limestone and dolomite of Mississipian and Pennsylvanian age which is present approximately 120 ft below the site. Although it does contain some interbedded sandstone and shale, the rock unit has low permeability and poor water quality with depth, so it has not been developed as an important aquifer in the area (Schicht, 1985, P. 8).

Unconsolidated deposits at the site generally consist of silty sand, silty clay, clayey silt and sand. Soil boring logs for piezometer test wells are contained in Appendix D. Additional soil sampling will be performed with installation of the monitoring wells. Geologic cross sections were drawn and are contained on Drawing 60425-26.

2.1.2.2.1 Hydraulic Gradients

Water levels were collected by Granite City Steel at the piezometer test wells installed during 1982. The wells were installed for level monitoring only and are not sufficient for sample collection. The water levels are presented in Table 1. A water table map constructed using water level measurements obtained from these measurements are presented on Drawing 60425-25. The water table map shows that groundwater in the shallow unconsolidated deposits flows generally toward the south. The hydraulic gradient across the site ranged from .0025 ft/ft to .00017 ft/ft on May 11, 1982.

2.1.2.2.2 Groundwater Flow

The groundwater flow velocity cannot be calculated at this time as hydraulic conductivity tests have not been performed. These tests will be done at the proposed monitoring well location. Velocities for the nearby Granite City landfill site were found to be 1 to 22 ft/year. (See Development and Closure/Post Closure Applications dated July 1988.) Flow velocities will be provided as soon as the monitoring wells are installed and hydraulic conductivity tests are performed.

2.1.2.3 Groundwater Quality Surrounding Landfill

Background groundwater quality monitoring will be performed once monitoring well locations are approved and the wells are installed. Further discussion on the proposed groundwater monitoring program is contained in Section 2.3.

2.1.3 Regional Water Quality and Usage

The U.S. Army Corps of Engineers and the U.S. Geological Survey conducted a study of the groundwater quality in the American Bottoms, the region which includes the East St. Louis and Granite City area (Voelker, 1984). Samples were collected from 63 wells, most completed to depths greater than 100 feet. It was found that water quality was generally within the Illinois Water Quality Standards. However, Illinois public water supply, effluent, and general water quality standards were exceeded by iron, manganese, and total dissolved solids in 79, 92, and 67 percent of these samples, respectively.

Before settlement in the East St. Louis, Granite City area, there were numerous swamps, lakes and poorly drained areas, indicating that groundwater was very close to the surface. The abundance of groundwater, as well as proximity of the Mississippi River and railroads, attracted major industrial development in the area through the 1950's. The sand and gravel aquifer was developed as a major industrial aquifer. Over-pumpage in some areas, and a protracted drought from 1952 to 1956, resulted in numerous wells going dry. Since that time, many industries have developed surface sources for water supply (Voelker, 1984).

At present, the primary use of the groundwater in the American Bottoms is industrial. There are few private wells and most municipal water supplies are derived from surface water sources which require pretreatment such as the Mississippi River.

2.2 HYDRAULIC PROPERTIES OF GRANITE CITY STEEL LANDFILL

2.2.1 Source Control

To evaluate volumes of leachate leakage, a water balance analysis was conducted using the computer program entitled "Hydrogeologic Evaluation of Landfill Performance", or the HELP model, Version 2 (Schroeder et al., 1988).

Average annual climatologic conditions for E. St. Louis, Illinois were used for input to the model. Soil parameters were selected based on soil types present at the site. The soil characteristics included infiltration rate, porosity, wilting point, hydraulic conductivity, evaporation coefficient and other factors for the proposed cover material. Evapotranspiration estimates

were based upon leaf area indices for good vegetation of the site. Moisture routing was also dependent upon the existing cover layer configuration, soil compaction, and vegetative cover.

Potential leachate production at the site was calculated using a 3-layer cover configuration consisting of 6 in. of topsoil, 24 in. of root zone material, and a combination barrier layer of 6 in. of low permeability material plus the synthetic liner. This simulation assumes good vegetative cover. Print out from the HELP model is included in Appendix E. To summarize, average annual leakage through the cover system estimated by the HELP model was approximately 0.004 in./yr.

Because the HELP model is an empirically based model, it should be recognized that the calculated result is not an absolute value, but rather represents the order of magnitude of infiltration which can be expected for a site with the characteristics of the Granite City Site.

2.3 GROUNDWATER MONITORING PLAN

The groundwater monitoring plan at the GCS landfills was designed to form a database of background water quality and to measure landfill performance by providing an early indication of any release of contaminants to the uppermost aquifer.

2.3.1 Monitoring Well Locations

It is proposed to install one upgradient and three downgradient monitoring wells at the site. The proposed well locations are shown on Drawing 60425-27.

2.3.2 Monitoring Well Construction

The proposed wells will be constructed with 2-inch I.D., Schedule 40 PVC well casing and flush threaded 0.010 in. slotted PVC screen. A sand pack will be placed around the screen, extending approximately two feet above the top of the screen. A bentonite pellet seal will be placed on top of the sand pack and the remaining well annulus backfilled with a bentonite/cement grout. A locking steel protective casing will be placed over the well. The casing will be set in a concrete pad. The pad will be sloped away from the casing. Wells will be developed using a dual tube air system.

2.3.3 Groundwater Sampling Procedures
See Appendix F for the proposed sampling procedures.

2.3.4 Groundwater Monitoring Program
Groundwater monitoring will be performed quarterly at one upgradient and three downgradient wells for the parameters listed in Table 2. All of the parameters in Table 2 will be analyzed for one year. A prediction limit statistical analysis method will be used to determine if impacts on groundwater are occurring. See Appendix G for method. A prediction limit will be calculated for each parameter using results from the upgradient wells. At sampling, every concentration of every parameter from the downgradient wells will be compared to its respective prediction limit. If the concentration does not exceed its prediction limit, groundwater has not been impacted.

In addition, as monitoring data accumulates, a prediction limit will be calculated for each parameter at each well location. Then, sampling results will be compared to the prediction limit at the same well to detect if any significant changes have occurred over time at the well location.

After the first year, analysis as described above may indicate that some parameters can be omitted from the monitoring list because concentrations are below the prediction limits. Wells will continue to be monitored quarterly for a reduced list of parameters for the remaining long-term care period of four years.

If, at any time, monitoring results indicate concentrations greater than the prediction limit for a parameter, further investigations will be made.

2.4 REFERENCES FOR SITE CHARACTERISTICS

Bergstrom, R.E. and T. R. Walker, 1956. Groundwater geology of the East St. Louis Area, Illinois: ISGS Report of Investigation 191.

Emmons, J.T., 1979, Groundwater Levels and Pumpage in the East St. Louis Area, Illinois 1972-1977: Illinois State Water Survey.

1.2 SITE DESCRIPTION

Granite City Steel's waste management site proposed for closure is located in the NW 1/4 of Section 29 and in the SW 1/4 of Section 20, T3N, R9W of the Third Principal Meridian, Nameoki Township, Madison County, State of Illinois. Refer to the Land Ownership and zoning Maps on Drawings 60425-23 and 24 and Appendix B for additional information.

Local population density estimates are as follows based on a July 1, 1986 census:

Granite City	35,150
City of Madison	4,800
City of Venice	3,770
Nameoki Township	13,390
Venice Township	8,910

Because Granite City Steel Landfill does not accept waste from outside sources, and is not considered a regional facility, population information is not specifically applicable to regional waste generation rates.

1.3 NEEDS ASSESSMENT

Granite City Steel generates waste as outlined in Section 3.3.1 of this report. The regional landfill sites in the Granite City area do not have the capacity to handle these wastes nor are they specifically permitted to accept these wastes; therefore Granite City Steel seeks to permit their existing fill area as a closed landfill for ultimate disposal of their waste on their own property.

3.0 CONSTRUCTION AND PRECLOSURE PLANS

3.1 INTRODUCTION

This section provides a discussion of design reasoning and logic to facilitate IEPA review of the Closure/Post Closure Permit Application. Engineering details illustrating design specifications are referenced as applicable and presented on the drawings.

Granite City Steel is seeking a closure/post closure care permit for their Waste Management site. It is proposed to shape the existing fill with the minimum amount of earth moving required, prior to placing the final cover. Monitoring wells will be installed prior to closure activities. Refer to Section 2.3.

3.2 DESIGN DESCRIPTION

3.2.1 Closure System

3.2.1.1 Type of Cover

The proposed closure of the site includes placing a 3-ft thick final cover layer, as illustrated by Detail 1/7 on Drawing 60425-29 and establishing vegetative cover. This final cover will consist of (from bottom to top):

1. Six inch on-site low permeability grading layer: on-site material to provide a base for the synthetic membrane.
2. Geomembrane: High Density Polyethelene (HDPE) (60 mil).
3. Twenty-four inch granular cover: on-site materials to serve as a vegetative support for root penetration.
4. Six inches of topsoil.
5. Seeded vegetation compatible with local growing conditions (per IDOT specification).

Final grades for the sites as shown on Drawing 60425-27 of the Drawings will have 3 horizontal to 1 vertical sideslopes and plateau slopes of 2%. On the east side of the road, the top elevation will be 424.2 ft and on the west, 428 ft.

All final grade surfaces will be vegetated using a seed mix similar to the Illinois Department of Transportation Highway Mix Class II. Prior to seeding, the topsoil layer is prepared by loosening the top 2 inches and leveling. Fertilizer and mulch is also applied to complete the seeding operation. Root penetration will not affect the geomembrane. It will be necessary to obtain topsoil from off the site, but on Granite City Steel's property or from an off site source.

3.2.1.2 Surface Water Drainage

A surface water drainage plan will be implemented for the following purposes: to control erosion of the landfill cover, to collect, route and convey stormwater runoff, and to minimize ponding and subsequent infiltration into the landfill. The surface water drainage system will include surface water diversion berms, perimeter drainage swales, and temporary containment berms.

The site is designed to drain surface water off in all directions to low areas off site. Drainage swales will be constructed along both sides of the road to divert stormwater runoff to off-site low areas where it will percolate into the ground. Refer to Drawing 27 for these locations and directions of flow.

3.2.1.3 Gas Control

A gas venting system is incorporated into the landfill design to be installed during placement of final cover. The purpose is to relieve gas pressure from the fill area. Pressure relief vents will be installed at 200-foot intervals across the ridges of the plateau area. Refer to Detail 1/7 on Drawing 60425-29 and to Drawing 60425-27 for locations.

3.2.2 Borrow Areas

Granular material will be excavated from a borrow area on Granite City Steel's property but outside the site construction area, or from an off site source. A total of 46,600 cu yd will be needed from the borrow area.

3.3 Preclosure Plan

3.3.1 Types of Waste & Quantities

The Granite City Steel landfill was used only for the disposal of non-hazardous waste materials generated by the Company's operations and related construction activities. These waste materials consist primarily of dusts and sludges collected by air and water pollution control systems, and general construction/demolition/clean-up type waste materials. A breakdown of the waste materials by type is provided in Table 3. The total in-place waste volume is 283,000 cu yd. Refer to Table 4 for additional material quantity data.

3.3.2 Construction

The construction procedures addressed in this section are presented to direct construction personnel for preclosure and closure of the site. The main work elements include: monitoring well construction, grading of existing fill material and final cover construction.

Access to the facility will be provided from the existing entrance from the intersection of 20th Street and Edwardsville Road north of the existing site and existing access roads.

Monitoring wells will be located as shown on Drawing 60425-27 and installed per Section 2.3.2 of this report and per the detail on Drawing 60425-29.

The existing waste will be graded to created uniform grades 3 ft below the final cover grades shown on Drawing 60425-27. The final cap will cover all waste materials in the waste management site. Sideslopes will be 3H:1V and top slopes will be 2%. Swales will be constructed on either side of the access road having longitudinal slope of 0.5% and 2H:1V sideslopes. Swales will be V-notch with a minimum depth of 2 ft.

Final cover construction will consist of placement of 6 in. low permeability grading layer. Then, a 60 mil HDPE geomembrane and 24 in. on-site granular cover will be placed and compacted to a density of 90% standard Proctor. A 6-in. layer of topsoil will be placed over the granular cover. This material

will be spread over the compacted on-site material and will be graded level for vegetation preparation. If needed, this material will be amended with lime, fertilizer and/or organic matter to enhance the vegetative growth capacities.

Landscaping of the final landfill surface includes seeding, fertilizing and mulching of the topsoil surface. Seed mix similar to the Illinois Department of Transportation Highway Mix Class II will be used. Prior to seeding, the topsoil will be prepared by loosening to a depth of 2 in. and leveled. The seed will be uniformly applied to the prepared topsoil area at the application rate pertinent to the seed mix and lightly raked or suitably rolled into the ground. Hay or straw mulch will be placed to a loose depth of 1/2 to 1 1/2 in. over the seeded topsoil.

All construction activities performed for the site will be observed with records maintained of the construction effort performed. This information will be available to the IEPA for their records. The report may include drawings illustrating areas of work and soil testing and a narrative describing work performed. Soil test results will be assembled as an Appendix.

3.3.3 Surface Water Drainage Plan

Control of surface water is necessary to assist in providing all weather access around the site, to minimize infiltration and to reduce potential erosion problems. Maintaining a good vegetative cover on all areas except will help to prevent erosion. Drainage swales will be installed to carry surface water off site. Drainage swales will be inspected for deposition of sediment or other debris that would hinder the flow of water. Such materials will be removed if found. Areas of erosion during initial establishment of the vegetative cover will be regraded and vegetated to maintain the cover layer.

3.3.4 Gas Control Plan

Pressure relief vents as detailed on Drawing 60425-29 will be constructed to aid in the release of landfill gas.